

NEW LIGHTCURVES OF 1027 AESCULAPIA AND 3395 JITKA

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We present new measurements for the rotation periods of two near Earth asteroids: 1027 Aesculapia and 3395 Jitka, the latter of which has been measured for the first time. Our measured period for 1027 Aesculapia is 9.79 ± 0.01 h and amplitude of 0.09 mag, which is inconsistent with the previously published measurement of 6.83 ± 0.10 h. The origin of this discrepancy is uncertain. We measure the period of 3395 Jitka to be 9.12 ± 0.02 h with an amplitude of $A = 0.42$ mag.

All observations of these two asteroids were taken with the 0.5-m telescope owned by the Meteoroid Environment Office (MEO) located at the New Mexico Skies observatory in Mayhill, New Mexico. This telescope was equipped with an *Apogee* U42 CCD camera. The Johnson V band filter was used for all observations. On a given night, the telescope had dedicated imaging of a single target for as long as the weather allowed- resulting in up to ~ 8 hours of continuous imaging of each asteroid. Individual image exposures were set to 60 s.

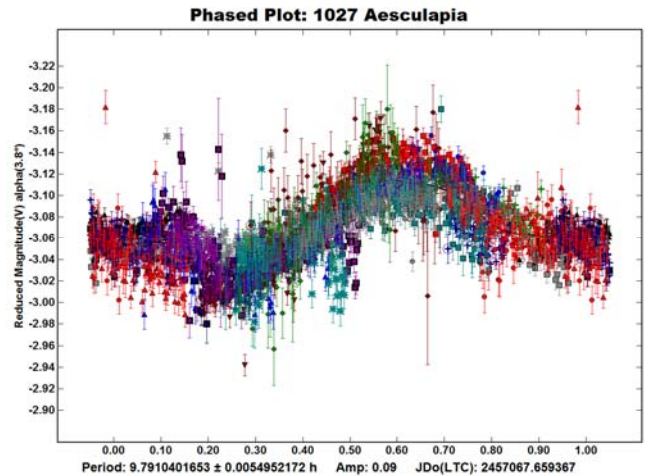
Images were corrected for bias noise, dark current, and flat-fielding using the MEO's telescope image analysis pipeline software. All light curve photometry and period measurements were performed using *MPO Canopus* version 10.4.3.17 (Warner, 2006; Warner 2012), using the standard Fourier series based fitting algorithm (Harris *et al.*, 1989) provided by *MPO Canopus*. All of our data were fit to this model using six orders.

1027 Aesculapia. Observations of the asteroid 1027 Aesculapia were taken starting the night of 2015 February 14 through the night of 2015 March 16. In total, images were acquired on twelve separate nights.

Photometric conditions between nights and over the course of each individual night varied greatly, but all of these data are consistent with a rotation period of 9.79 ± 0.01 h, as shown in the figure below. The amplitude of variation was measured at $A = 0.09$ mag. These measurement are in strong tension with a previously measured period for this asteroid made by Maleszewski and Clark (2004) of 6.83 ± 0.1 h and amplitude of $A = 0.15$ mag. Attempts to fit our data with a model that assumes a 6.83 h period were shown to provide a poorer fit to our data.

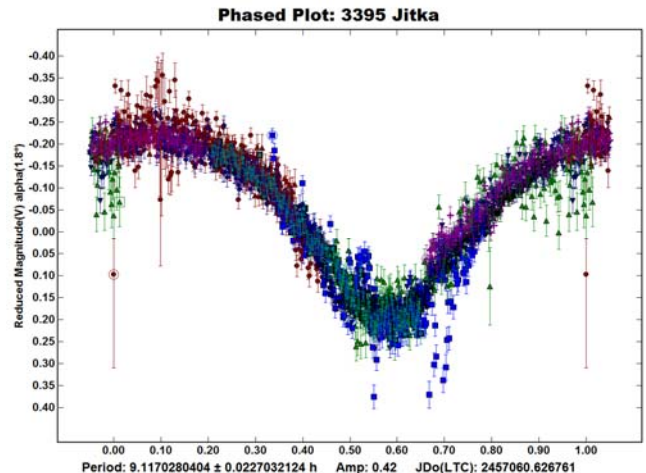
The origin of this discrepancy is not clear, although Maleszewski and Clark (2004) stated that further observations of this asteroid were necessary for more conclusive measurements. Given the estimated 20 km size for this asteroid (Maleszewski and Clark, 2004) and the 11-year gap between those observations and our

own, it is unlikely that such a large variation in the period can be caused by radiative spin-down like the Yarkovsky-O'Keefe-Radzievskii-Paddack (YORP) effect. The YORP effect is estimated to spin-down this asteroid on time scales many orders of magnitude longer than this observation gap (Rubincam 2000). Tidal disruptions are also unlikely to be the source of the spin-down, as this Main Belt asteroid whose distance with respect to the planets remains largely constant. Other physical origins for this spin-down such as impacts or tumbling cannot be ruled out, but it is beyond the scope of this bulletin to investigate these possibilities in detail. Discrepancies between the analysis procedures of this work and the previous measurement may also be responsible for this disagreement. Further observations will be needed to resolve the tension between these two measurements.



3395 Jitka. Observations of the asteroid 3395 Jitka were taken between the nights of 2015 February 7 and 2015 February 13. In total, images were acquired on five separate nights. No previous light curve observations of this asteroid are currently available in the literature for comparison. Photometric conditions for the five nights of observations were more stable than those for 1027 Aesculapia.

The best-fit period for these data is measured to be 9.12 ± 0.02 h, with amplitude of $A = 0.42$ mag. The phase-folded light curve is shown in the figure below.



References

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